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AN ANALYSIS OF A SERIES OF PHOTOGRAPHS OF THE COMMON TERN

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From June 21-30, 1930, I made a study of a colony of the Common Tern (*Sterna hirundo* Linnaeus) on Upper Sugar Loaf Island, Maine, the primary purpose of which was to secure a series of photographs illustrative of the nesting activities of this well known species.

Upper Sugar Loaf Island, with an area at high tide of approximately an acre and a half, projects from the tidal-churn where the Kennebec River flows into the Gulf of Maine. It is of ledge formation, with many irregular shelves which rise step-like thirty feet above the tidal line to a more or less level summit. A few scrub conifers grow among the crevices in the rocks, and grass, poison ivy, and certain flowering weeds flourish where the scant soil permits. At the time of my visit there were about 350 pairs of the Common Tern, six pairs of the Roseate Tern (*Sterna dougalli* Montagu) and three pairs of the Arctic Tern (*Sterna paradisaea* Brunnich) nesting on the island.

The behavior of these birds was not notably different from that observed at other tern colonies by various ornithologists. Some of the photographs secured are of interest, however, in that they record certain body attitudes of the birds themselves which are worthy of more than passing notice. Nine of these photographs are presented here in the belief that such studies are always of interest to close students of bird behavior.

The photographs were made with a Graflex camera equipped with a Protar VIIa lens and a double extension bellows, and supported, where necessary, by a Crown A tripod. A burlap blind, with wooden framework, placed six or eight feet from the nests offered sufficient

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concealment. With a floor space of six by four feet, and a height of six and a half feet, there was ample room in this blind for two people to work with comparative ease.

Frontispiece. (Fig. 33). Here the parent (sex uncertain), with wings loosely crossed, is about to settle upon the three eggs, one of which has already started to hatch. Most nests in the colony contained three eggs. The nesting-site is characteristic.

Figure 34. Here a parent tern is in the act of feeding a chick beneath the right wing of its brooding mate. The chick was about twenty-four hours old.

This type of "coöperative" feeding of the young was observed to occur in two ways. First, as shown in this photograph, where one adult gave the food directly to the young beneath the breast of its mate; and second, where the food was passed to the bill of the brooding bird who in turn fed the chick beneath it.

Forbush (*cf.* Bent: "Life Histories of North American Gulls and Terns," 1921, p. 276) writes of a similar method of feeding the young among the Least Terns (*Sterna antillarum* Lesson). The first time the male Least Tern appeared, it performed this second type of feeding. The next time, the female refused to accept the fish, with the result that the male swallowed it.

Among the Common Terns observed on Upper Sugar Loaf Island, no such behavior was noted. If a brooding bird refused to take the fish from its mate, the mate always fed the young directly.

Figure 35. Here a tern is in the act of picking up a film carton which the wind carried to the nest.

The reaction of the returning adult to the presence of the film carton was both interesting and amusing. It approached the nest twice, the second time with its mate (distinguished by several white feathers on the crown), eyeing the object with grave suspicion. After a lapse of six minutes it began pecking at the box in several places in an attempt to pick it up. Finally it secured a satisfactory hold on the flap of the open end and flew with it to a distance of fifty feet out over the water and dropped it from mid-air.

I did not perform any experiments with other objects to determine the tern's attitude toward chance material which might lodge in the nest. The film carton was treated precisely as empty egg shells are treated after the chicks have hatched. Twice I observed terns flying away with such shells which they dropped, invariably, in the water. When I placed another film carton about a foot away from the nest, the returning bird appeared to pay not the slightest attention to it.



FIG. 34. "Coöperative" feeding.



FIG. 35. Showing stereotyped behavior with a "foreign" object.



FIG. 36. One mate is distinguished from the other by certain white feathers in the crown.



FIG. 37. Both birds exhibiting the brooding instinct.



FIG. 38. Compare the forficated appearance of the tail in Figure 37 with this figure.



FIG. 39. The bird alighting. Note depressed tail, position of the feet, wings, and body.



FIG. 40. Brakes set. See text for description of this position.



FIG. 41. Horizontal flight.

Figures 36 and 37. These photographs, taken in rapid succession, show an adult Common Tern in the act of pushing its mate bodily from the nest. They were taken two days before the hatching of two chicks from the three eggs contained in the nest.

Judging from the actions of this pair of terns I am of the opinion that the incubation instinct is about equally strong in both sexes at least during the few days prior to the hatching of the chicks. Ornithologists agree that in this species the sexes are colored alike, so it is impossible, in these photographs, to make certain which is the female. For the sake of making our discussion easier, however, let us assume that the bird with the white flecking in the crown patch is the female.

When the male returned to relieve his mate, the female showed no inclination to leave the nest. He circled the nest several times, then flew away for a short period only to return and repeat the act. While standing in the vicinity of the nest he picked up pieces of vegetation, small pebbles, and bits of shells in his mandibles and deliberately tossed them about—sometimes over his back or to one side. He was obviously nervous and annoyed. Finally, as though able to withstand the desire to incubate no longer, he approached his mate and began pushing her bodily from the nest. The female reluctantly gave up her place and flew off as the male settled in the usual manner on the eggs.

As a rule no such behavior as this was noted. When one bird came to relieve the other of the duties of incubation, the shift was made without the slightest delay.

It will be noted, in these photographs, that the wings of the bird which had been incubating are crossed below, not above the tail. This attitude was frequently assumed on the nest. The white flecking in the crown of this individual is noteworthy also. A number of birds in the colony were marked thus, and this variation made it possible to recognize certain birds and therefore to keep a more accurate record of their individual activities and of their reactions to each other and to various elements of their environment.

Figure 38. A Common Tern is hovering above the vicinity of the nest. The wings have just begun the downward stroke. Note the strongly curved position of the primaries of the left wing, and the position of the yielding secondaries of the right wing.

Of particular interest is the fact that the tail in being widely spread has lost entirely its usual forficcate appearance. Thus spread, the twelve rectrices are ready to act as a powerful brake should the tail be pressed downward, or, as in the present case, as the greatest

area of gliding surface capable of being produced by the tail alone. It is not functioning, for the moment, primarily as a rudder.

Figure 39. The tern is starting to alight, coming downward more or less vertically.

The tail has been directed downward from its usual horizontal position in flight and is serving as a brake. The feet, too, are extended, partly perhaps, as brakes, and partly in readiness for alighting. The head is, in turn, extended and bent downward, thus shifting the center of gravity forward to some extent.

Figure 40. Here a tern, hovering about four feet above a crest of a cliff, is about to alight.

The feet are extended. The body is in an almost vertical position. The wings, which are now beating forward, rather than directly downward as in usual flight, are loosely held at the wrists; and the tips of the primaries extend forward beyond the body of the wing.

The position of the feathers of the wing is exceedingly interesting. The manus evidently is loosely held, the forward-downward thrust being strongest at the wrist, thus throwing the proximal primaries, which are attached at the wrist, actually in advance of the distals. The distal secondaries, which are not so firmly attached to or connected with the bone as are the primaries, naturally are pulled downward with the primaries as the wrist is thrust downward, though it will be noted that there is a definite gap between the outermost secondary and the innermost primary.

Figure 41. Now, the bird is gliding rapidly forward with wings in a lateral position.

The general features of gliding flight are apparent here. The tail retains the typical deeply forked formation of the *Sterninae*. The legs are drawn partially backward and upward to the under surface of the body. As contrasted with the remiges in the three preceding figures, the primaries are partly folded and directed posteriorly due to an increase in flexion at the wrist.

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